



PATENT SPECIFICATION

NO DRAWINGS

1,019,147

Date of Application and filing Complete Specification: Nov. 1, 1962.
No. 41422/62.

Application made in United States of America (No. 155,496) on Nov. 7, 1961.
Complete Specification Published: Feb. 2, 1966.

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Index at acceptance:—A2 B (1C, 1H, 1L, 1T)
Int. Cl.:—A 23 11/14

COMPLETE SPECIFICATION

Fatty Compositions

ERRATUM

SPECIFICATION No. 1,019,147
Amendment No. 2

Page 1, Heading, *delete* "Application made in United States of America (No. 155496) on Nov. 7, 1961." *insert* "Application made in United States of America (No. 155496) on Nov. 28, 1961. Application made in United States of America (No. 150637) on Nov. 7, 1961."

THE PATENT OFFICE
15th August 1967

ERRATA

SPECIFICATION No. 1,019,147
Amendment No 1

Page 6, line 45, for "formation" read "formulation"

Page 7, at the top of the page *insert*
"EXAMPLE VII"

Page 7, line 10, for "Lactopatmitate B," read
"Lactopalmitate B,"

THE PATENT OFFICE
8th March 1966

45 produced from some of the prior art formulations tend to be unstable on standing, that is to say the foam cells agglomerate to form large bubbles, resulting in a coarse, sponge-
[Price

When lactylated glycerol esters such as are referred to above have been used as emulsifiers in fatty compositions they have hitherto been used in low proportions, usually about 90

1019,147



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COMPLETE SPECIFICATION

Fatty Compositions

We, UNILEVER LIMITED, a Company registered under the laws of Great Britain, of Port Sunlight, in the County of Chester, England, do hereby declare the invention, for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:

The present invention relates to fatty compositions and especially to dry compositions from which whipped dessert toppings can be formed by mixing with water or milk.

Topping mixes, that is compositions which can be whipped when mixed with water or milk to produce whipped dessert toppings, that is aerated products similar to whipped cream and suitable for use in covering various articles of confectionery and desserts are known. (When "toppings" are referred to below without further qualification whipped dessert toppings are meant). These compositions take the form of pastes or free-flowing powders. The powders have the advantage of being easy to handle and of undergoing little or no change when stored for long periods of time. Powders of this type commonly comprise fat particles covered with dissimilar solid materials, the latter being soluble or dispersible in aqueous media. A typical product may contain about 30-80% fat, 2-35% sugar, 5-30% non-fat milk solids and 3-20% of an emulsifier. These products are generally prepared by forming an aqueous emulsion and subsequently drying the emulsion.

The prior art powdered compositions either produce a poor overrun when they are whipped, (that is, the resulting foam contains a relatively low proportion of air) or else they have too little fat present to have the organoleptic properties of toppings based on whipping cream. In addition, the foams produced from some of the prior art formulations tend to be unstable on standing, that is to say the foam cells agglomerate to form large bubbles, resulting in a coarse, sponge-

like structure which is undesirable.

It is an object of the present invention to produce an easily handled, stable, dry fatty composition in powder form, which, when mixed with milk or water and then whipped, yields a large volume of stable, whipped product of texture and appearance of similar to that of natural whipped cream.

It has now been found that this object can be achieved in compositions comprising a fat, a sweetening agent, a water dispersible protein, together with an emulsifying agent composed essentially of at least 5% (by weight) of lactylated glycerol esters of palmitic and/or stearic acids, preferably with the addition of smaller proportions (for instance 0.5 to 2%) of an oleic acid partial glyceride or of lactylated glycerol esters of oleic acid. Preferably, lecithin is also included in the emulsifier mixture.

By lactylated glycerol esters of palmitic and/or stearic acid is meant mixtures of esters composed mainly of di- and tri-glycerides of lactic and palmitic and/or stearic acid, such as are obtained by reacting mono- and diglycerides of palmitic and/or stearic acid with lactic acid under conditions leading to esterification of free hydroxyl groups in the mono- and di-glycerides. Similarly, lactylated glycerol esters of oleic acid means mixtures composed mainly of di- and triglycerides of lactic and oleic acid such as are obtained by reacting mono- and diglycerides of oleic acid with lactic acid under such conditions.

These ingredients are combined in an aqueous emulsion and the emulsion is spray-dried to give a free-flowing powder having superior handling characteristics. On mixing this powder with water or milk, and whipping, a whipped topping having good overrun is obtained.

When lactylated glycerol esters such as are referred to above have been used as emulsifiers in fatty compositions they have hitherto been used in low proportions, usually about

[Price

1% based on the weight of fat.

In the development of the present invention, it was found that formulations containing conventional levels, i.e., about 1%, of glyceryl lactopalmitates or glyceryl lactostearates as emulsifiers were ineffective in preparing dry topping mixes. Surprisingly, however, it was found that emulsions made from dry compositions containing high levels, i.e. 5% or more, of glyceryl lactopalmitates or glyceryl lactostearates alone could be whipped to a relatively high overrun, i.e., 240% with 5 to 7 minutes of whipping with a conventional household electric mixer. Such emulsions can be spray-dried and, when rehydrated, their whipping ability is essentially unchanged. It was also found that the properties of the composition especially in respect of the texture of the whipped toppings formed therefrom by mixture with milk or water, can be further improved by including, in addition to the specified emulsifiers, smaller proportions, such as 0.5 to 2% of the weight of the composition, of oleic acid partial glycerides or lactylated glycerol esters of oleic acid.

The whipping properties depend on the use of high levels of an emulsifier of the kind indicated herein. From 5 to 15% of glyceryl lactopalmitates and/or of glyceryl lactostearates can be used. Generally, the higher concentrations of emulsifier will reduce the whipping time required to make a dessert topping from the composition. The use of a glyceryl lactooleate emulsifier or an oleic acid partial glyceride alone was found to give an adequately stable emulsion, but one which had no whipping ability whatsoever. A composition containing a combination of lactopalmitates or lactostearates with one of these unsaturated fatty acid esters, however, gives an unexpected improvement when compared with a composition based on glycerol lactopalmitate alone; overrun is increased to 300% or higher, whipping time is reduced by as much as 50%, and the texture of the whipped product is distinctly improved. Such emulsions can be dried by means of a spray dryer or other mild drying procedure, for example a freeze or vacuum dryer, and, when rehydrated, their whipping ability is essentially unchanged.

Thus, in the preferred form of the present invention there is used from 5% to 10%, by weight, of the glyceryl lactopalmitates or glyceryl lactostearates in conjunction with from 0.5% to 2% by weight of a glyceryl lactooleate, a glyceryl monooleate or a glyceryl dioleate or mixtures thereof. The combination of these emulsifiers in a topping mix containing 30 to 55% of fat, 25 to 45% of sweetening agent, and 6% to 11% of protein, serves to accomplish the objects of the present invention. Further textural improvement is obtained by the addition of 1% to 3% of a

lecithin to the formula. A suitable lecithin is "Alcolec PSH," a product sold by the American Lecithin Company. The lecithin also eliminates an undesirable glossy appearance of the whipped product, improves peaking ability, (the ability to be whipped into the form of a peak and to retain that form) and accelerates melting of the product in the mouth.

The fat in the product imparts the desired creamy mouth feel. Products having a high fat content do not exhibit the crusting-over effect on standing shown by toppings low in fat and high in sugar. Suitable edible fats have a capillary melting point from about 35°C. to about 40°C. Specific examples of fats which can be used according to this invention include soybean oil having an iodine value of about 80, partially hydrogenated cottonseed oil, coconut oil, and appropriate blends thereof.

Sodium caseinate is an example of a water-dispersible protein suitable for use according to this invention. This material is believed to act by coating the fat particles during spray drying. On rehydration, the coating acts as a whipping aid as well as a foam stabiliser. Suitable forms of sodium caseinate materials which are relatively soluble at a pH of from 6.0 to 7.5 are commercially available. Topping mixes are preferably prepared in this pH range where the protein, by virtue of its dispersibility in water, probably can more readily form a film around the oil globules. At lower pH, e.g., around the isoelectric point of the protein, the protein can be expected to be relatively ineffective. Other suitable water-dispersible proteins such as non-fat milk solids and neutral water soluble soybean proteins, which act as coating agents in the preparation of dry fats, are equally satisfactory in the present invention.

The sweetening agent of this invention may be a sugar, preferably sucrose.

The glyceryl lactopalmitates or lactostearates of the present invention were commercial products which can be obtained by lactylating a mono- and di-glyceride concentrate prepared from sources rich in palmitic and/or stearic acids, the lactylation being effected by heating the concentrate at about 180°C. with lactic acid under reduced pressure so as to distil off first water and then any residual lactic acid and glycerol as described for instance in U.S. Patents No. 2,509,414 and 2,690,971. Two suitable commercial lactopalmitate preparations are referred to below as "Lactopalmitate A" and "Lactopalmitate B" respectively. The first, sold as "Atmul 200" by Atlas Powder Co., contains approximately 10.5% of tripalmitin, 45.5% of lactoyl dipalmitin, 40.5% of glyceryl trilactate, and 3.4% of glyceryl dilactate. The proportions of these esters in the second, sold as "Drumulse 9169" by E.F.

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Drew Co., are approximately 14, 50.5, 33.3 and 2.4% respectively. Small proportions of the corresponding esters of stearic acid are also present in both products. While the lactopalmitates are preferable, the lactostearates are satisfactory if the preferred formula is slightly modified. For example, a composition containing 10% lactostearate in combination with a 2% level of lactooleate gives a 330% overrun with a mixing time of 3 minutes and the topping obtained has good texture.

The lactylated oleic acid esters of glycerol used are obtainable by lactylating, by the same general method, a commercial oleic acid mono-diglyceride concentrate. Preferably a commercial lactylated glyceryl oleate sold as "Drumulse 9327" by E.F. Drew Co. is used. Of the partial esters of glycerol the dioleate is preferred, although the monooleate, or mixtures of the two, can also be used, but care must be taken that they are sufficiently pure not to contribute an off flavour to the products. The monooleate as obtained commercially, commonly contributes a strong off flavour and is not therefore recommended.

The use of lecithin as an ingredient of the composition of this invention results in even further improvement in texture. Two suitable lecithins which are commercially available are referred to below as "Lecithin A" and "Lecithin B" respectively. The first had a moisture content of 2%, a content of benzene-insoluble material not more than 0.15%, acid value not more than 16, and content of acetone-insoluble material not more than 52%. Corresponding figures for the second were: 1%, 0.20%, 30.0% and 60% respectively.

The first dispersed more readily in water and formed an oil in water type of emulsion while the second was more lipophilic and favoured the opposite type of emulsion.

The formulations based on combinations of emulsifiers in accordance with the present invention can be whipped well both before and after spray-drying. The whipping characteristics of such formulations are the same whether they are prepared as a 60% solids concentrate and diluted to about 35% solids with cold milk for whipping, or spray-dried, diluted with cold milk to 35% solids, and whipped.

In reconstituting the compositions of the present invention, from about 3.8 to about 4.2 fluid ounces (106-117 cc) of milk or water are added to from about 2.4 to about 2.7 ounces (67-78 g.) of spray-dried powder.

It has also been found to be advantageous, in certain instances, to use a gum such as gum arabic. This material appears to improve the coating effectiveness of the protein, and, in the particular spray drier used, facilitated collection of the spray-dried materials, i.e., it tended to improve the free-flowing character of the powder.

The following Examples illustrate the invention.

EXAMPLE I

This example illustrates the unexpected results obtained by using a composition containing a high level of glyceryl lactopalmitate as an emulsifier compared with the results obtained from a conventional level of the former material.

Percent Composition Based on Dry Weight

	A	B
Blend of 10% cottonseed oil and 90% soybean oil, hydrogenated to about 82 Iodine Value		
Sugar (Sucrose)	57.75	50.75
Sodium Caseinate	30.00	30.00
Lactopalmitate A	11.00	11.00
Gum Arabic	1.00	8.00
	0.25	0.25

Both samples were prepared for spray-drying at 40% solids by dissolving the emulsifiers, in the oil at 60-70°C., dissolving the sugar, caseinate and gum in water in a separate vessel at 50-60°C. using a high speed mixer, blending the two phases at 60°C. using the high speed mixer, and homogenizing the mixture at 50-60°C. with a homogenizer operated at 3000 psig. The emulsions were then spray-dried in a laboratory dryer using 400-500°F. inlet air and 190-200°F. outlet air.

Composition A was mixed with fresh milk to 40% solids. After whipping for 30 minutes it failed to produce a satisfactory overrun.

Composition B, on mixing with fresh milk to 40% solids, was whipped to provide a 220% overrun and a product with acceptable appearance, texture and eating quality.

The composition B spray dried powder described above was aged for several days and tested with added flavours. The following mixtures were hand blended.

	Raspberry Mix	Chocolate Flavour Mix
Composition B powder	86.63	74.9
Sugar	12.40	21.4
Raspberry flavour	0.31	
Cocoa powder		3.7
Sodium citrate	0.31	
Citric acid	0.35	

5 The raspberry mix (80 g) whipped with 1/2 cup milk to an overrun of 240% in 4 minutes and had a very good eating quality. The chocolate mix also whipped well (215% overrun) in proportions of 90 g with 1/2 cup cold milk to a good chocolate flavour topping. These results show that the spray

dried topping mix whipped more rapidly after some aging and was also suitable for use with added flavours.

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EXAMPLE II

Emulsions were prepared having the following composition, dry basis.

Percent Composition Based on Dry Weight

	A	B	C	D
Blend of 10% cottonseed oil, 90% soybean oil hydrogenated to approximately 821V	49.0	48.00	48	49
Lactopalmitate A	8.0	8.00	8	8
Lecithin A	—	—	2	1
Lecithin B	2.00	3.00	1	0.5
Sugar	29.5	29.75	29.75	30.25
Sodium caseinate	11.0	11.0	11	11
Gum arabic	0.5	0.25	0.25	0.25

15 These 60% solids emulsions were mixed with cold milk in the proportions of 110 cc

emulsion to 1/3 cup milk and whipped. The following observations were made.

	A	B	C	D
Sample				
Whipping time — minutes	4 - 5	—	—	4 - 5
Overrun — %	320	320	320	340

Toppings

- 20 A—Very good melt in mouth, somewhat too smooth.
 B—Good melt in mouth, short, slightly curdy texture. Emulsion B separated on standing.
 25 C—Good melt in mouth, short, slightly curdy texture.
 D—Mouth feel not as good as C.

These experiments demonstrate that modifications and improvements in textural properties of the whipped topping and stability

the emulsion for spray drying were obtained by the addition of lecithins to the formula.

A wide range of fats can be used in the compositions of the present invention depending on the textural characteristics desired. For example, soybean oil having an Iodine Value of about 80, or cottonseed oil having an Iodine Value of about 80, or a coconut oil blend consisting of 70% hydrogenated coconut oil, 15% coconut oil and 15% soybean oil having an Iodine Value of about 80 may be used in the following basic composition.

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Composition on Dry
Weight Basis, Percent

Fat	
Sugar	40.5
Sodium caseinate	40.5
Lactopalmitate A	8.0
Lecithin A	7.0
Lecithin B	2.0
Gum Arabic	1.0
	1.0

5 The products may be prepared as in the foregoing examples to give essentially the same results. Harder or softer oils may also be used, in which event a harder or stiffer product results.

EXAMPLE III

This example illustrates the unexpected results obtained by using as an emulsifier a composition containing glyceryl lactopalmitate with glyceryl lactooleate.

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Percent composition
Based on Dry Weight

Soybean Oil, 80 Iodine Value	
Sugar (Sucrose)	47.75
Sodium Caseinate	30.00
Lactopalmitate A	11.00
Lecithin A	7.00
Lecithin B	2.00
Lactooleate	1.00
Gum Arabic	1.00
	0.25

The lactooleate was a commercial lactylated concentrate of oleic acid mono- and di-glycerides sold as "Drumulse 9327."

15 The sample was prepared for spray-drying at 40% solids by dissolving the emulsifiers, including the lecithins, in the oil at 60-70°C., dissolving the sugar, caseinate and gum in water in a separate vessel at 50-60°C. using the high speed mixer, and homogenizing the

mixture at 50-60°C. with a homogenizer operated at 3000 psig. The emulsion was spray-dried using 400-500°F. inlet air and 190-200°F. outlet air. 20

The composition, on reconstitution with fresh milk to 40% solids, whipped in 3 minutes to give an overrun of 290% and had good peaking, a quick melt down in the mouth and a good overall appearance. 25

EXAMPLE IV

Ingredients

Composition on Dry
Weight Basis, Percent

Oil (80 Iodine Value Hydrogenated Soy Bean Oil)	
Sugar (Sucrose)	45.0
Sodium Caseinate	34.5
Lactopalmitate A	9.0
Lecithin A	7.0
Lecithin B	2.0
Lactooleate (as in Example III)	1.0
Gum Arabic	0.5
	1.0
	100.0

- The above ingredients were combined and spray-dried according to the method outlined in Example III. The spray-dried, non-greasy, free-flowing powder rehydrated rapidly with cold milk and whipped to a 320% overrun in 2 to 3 minutes using the high speed setting on an electric mixer. The topping was similar to whipped cream in many respects; it peaked well, melted down quickly in the mouth, and was very stable at room tem-

perature. No shrinkage or syneresis was evident after 8 hours at 75°F.

EXAMPLE V

Three different fats were employed in the formula below and the resulting products were evaluated. All gave essentially the same results. Those samples had the following basic composition.

Composition on Dry Weight Basis, Percent

Fat	40.5
Sugar	40.0
Sodium Caseinate	8.0
Lactopalmitate A	7.0
Lecithin A	2.0
Lecithin B	1.0
Gum Arabic	1.0
Lactoolacte	0.5

- The three fats tested were (a) 80 Iodine Value soybean oil, (b) 80 Iodine value cottonseed oil, (c) a coconut oil blend consisting of 70% hydrogenated coconut oil, 15% coconut oil and 15% 80 Iodine Value soybean oil. The products were prepared as in Example III, and gave essentially the same results as in Example IV. Harder and softer oils were also evaluated but gave either too soft or too stiff a product. Thus, a wide range of fats can be used, depending on the textural characteristics desired.

EXAMPLE VI

Flavouring of the product can be carried out either by spray-drying an emulsion containing the flavour or by subsequent addition of dry flavours. A flavoured product was prepared from sample (a) of Example V (80 Iodine Value soybean oil) by adding 0.1% of a compounded vanilla flavour to the aqueous emulsion. This flavour persisted through spray-drying and was present at a satisfactory level in the final product.

Dry fruit flavours can be blended into the dry mix as is shown below using sample (a) of Example V as the base.

Composition on Dry Weight Basis, Percent

Sample (a) Example V	86.63
Sucrose	12.40
Imitation Raspberry Flavour (dry)	0.31
Sodium citrate	0.31
Citric acid	0.35

- This formation mixed dry and whipped with cold milk (80 g/1/2 cup milk) yielded a very pleasant fruit flavoured topping.

A chocolate flavoured topping can also be prepared as the above using the following formulation.

Composition on Dry Weight Basis, Percent

Sample (a), of Example V	74.9
Sugar	21.4
Cocoa powder	3.7

This dry mix, when whipped with milk (90 g/1/2 cup and 1 teaspoon vanilla) yielded

a good chocolate topping.

Composition on Dry
Weight Basis, Percent

Oil (80 Iodine Value hydrogenated Soy Bean Oil)	
Sugar	45.0
Sodium Caseinate	35.5
Lactopalmitate A	9.0
Lecithin A	7.0
Lecithin B	2.0
Lactoolate	1.0
	0.5

5 The product was prepared as a 60% solids emulsion concentrate by the method outlined in Example III, cooled to 40°F., and diluted with milk to 35% solids for whipping. It yielded a 340% overrun after 3 minutes of whipping. The foregoing example shows that gum arabic is not essential for good whipping.

10 In these Examples Lactopalmitate A can be replaced by Lactopalmitate B, referred to above.

WHAT WE CLAIM IS:

15 1. A dry composition for use in preparing whipped dessert toppings, said compositions comprising a fat, a sweetening agent, a water dispersible protein and an emulsifying agent, the emulsifying agent comprising lactylated glycerol esters of palmitic and/or stearic acids, said esters being present to the extent of at least 5% of the weight of the composition.

20 2. A composition according to Claim 1 in which the said esters are composed substantially of lactylated glyceryl palmitates and are present to the extent of 5 to 10% of the weight of the composition.

25 3. A composition according to Claim 2 wherein the said esters are composed substantially of 10 to 15% of tripalmitin, 45 to 50% of lactoyl dipalmitin, 30 to 40% of glyceryl trilactate and 2 to 4% of glyceryl dilactate.

30 4. A composition according to any of Claims 1 to 3, wherein the emulsifying agent

comprises in addition to the said esters lactylated glycerol esters of oleic acid, present to the extent of 0.5 to 2% of the weight of the composition. 35

5. A composition according to any of Claims 1 to 3, wherein the emulsifying agent comprises in addition to the said esters an oleic acid partial glyceride. 40

6. A composition according to any of Claims 1 to 5 which contains a lecithin. 45

7. A composition according to Claim 6, containing a hydrophilic lecithin and a lipophilic lecithin. 50

8. Compositions suitable for the preparation of whipped dessert toppings, substantially as described in any of the Examples. 55

9. Compositions obtainable by mixing any of the compositions claimed in Claims 1 to 8 with water or milk. 60

10. Process for preparing a composition claimed in any of claims 1 to 7, which comprises forming an aqueous emulsion of the constituents of said composition and spray-drying said emulsion.

11. Process for making compositions suitable for use in the preparation of whipped dessert toppings, substantially as hereinbefore described.

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